TORQ Analysis of Computer Programmers to Computer Science Teachers, Postsecondary

INPUT SECTION:

Transfer	Title	O*NET	Filters		
From Title:	Computer Programmers	15-1021.00	Abilities:	Importance LeveL: 50	Weight: 1
To Title:	Computer Science Teachers, Postsecondary	25-1021.00	Skills:	Importance LeveL: 69	Weight: 1
Labor Market Area:	Maine Statewide		Knowledge:	Importance Level: 69	Weight: 1

OUTPUT SECTION:

Grand TORQ: 83

Ability TORQ	Skills TORQ	Knowledge TORQ
Level 90	Level 78	Level 80

Gaps To Narrow if Possible

Ability	Level	Gap	Impt
Speech Clarity	71	34	84
Oral Expression	73	11	90
Mathematical Reasoning	48	13	50
Speech Recognition	46	9	56
Oral Comprehension	71	5	78
Inductive Reasoning	59	4	72
Written Comprehension	69	3	81
Deductive Reasoning	62	3	75
Category Flexibility	50	4	53
Written Expression	67	1	72

Upgrade These Skills

Skill	Level	Gap	Impt
Instructing	85	23	98
Speaking	75	18	88
Mathematics	74	14	74
Monitoring	73	13	71
Writing	73	12	75
Time Management	65	12	74
Reading Comprehension	80	9	88
Learning Strategies	80	9	88
Active Listening	71	6	82
Active Learning	80	3	82

Knowledge to Add

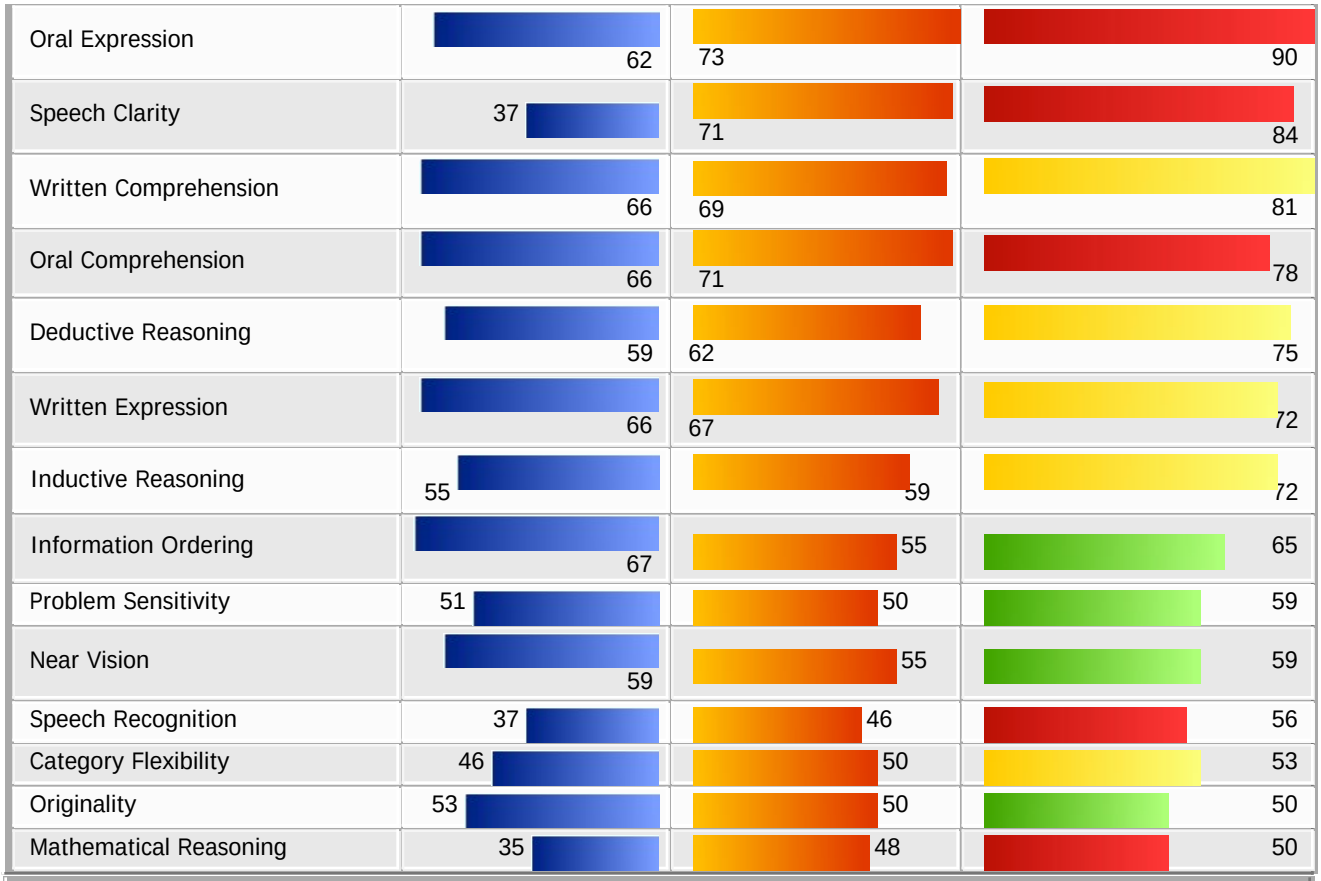
Knowledge	Level	Gap	Impt
Education and Training	89	50	88
English Language	76	18	83
Mathematics	76	12	72

LEVEL and IMPT (IMPORTANCE) refer to the Target Computer Science Teachers, Postsecondary. GAP refers to level difference between Computer Programmers and Computer Science Teachers, Postsecondary.

ASK ANALYSIS

Ability Level Comparison - Abilities with importance scores over 50

Description	Computer Programmers	Computer Science Teachers, Postsecondary	Importance



Skill Level Comparison - Abilities with importance scores over 69

Description	Computer Programmers	Computer Science Teachers, Postsecondary	Importance
Instructing	62	85	98
Reading Comprehension	71	80	88
Speaking	57	75	88
Critical Thinking	82	79	88
Learning Strategies	71	80	88
Active Listening	65	71	82
Active Learning	77	80	82
Complex Problem Solving	74	73	78
Writing	61	73	75
Mathematics	60	74	74
Time Management	53	65	74
Programming	77	61	73
Monitoring	60	73	71

Knowledge Level Comparison - Knowledge with importance scores over 69

Description	Computer Programmers	Computer Science Teachers, Postsecondary	Importance
Computers and Electronics	89	88	95
Education and Training	39	89	88
English Language	58	76	83
Mathematics	64	76	72

Experience & Education Comparison

Related Work Experience Comparison

Description	Computer Programmers	Computer Science Teachers, Postsecondary
10+ years	20%	1%
8-10 years	0%	0%
6-8 years	2%	6%
4-6 years	0%	13%
2-4 years	34%	46%
1-2 years	29%	19%
6-12 months	3%	3%
3-6 months	0%	2%
1-3 months	5%	0%
0-1 month	0%	0%
None	3%	7%

Required Education Level Comparison

Description	Computer Programmers	Computer Science Teachers, Postsecondary
Doctoral	17%	22%
Professional Degree	0%	1%
Post-Masters Cert	0%	0%
Master's Degree	0%	40%
Post-Bachelor Cert	0%	5%
Bachelors	63%	23%
AA or Equiv	4%	0%
Some College	10%	0%
Post-Secondary Certificate	0%	0%
High Scool Diploma or GED	0%	0%
No HSD or GED	3%	0%

Computer Programmers	Computer Science Teachers, Postsecondary
Most Common Educational/Training Requirement:	
Bachelor's degree	Doctoral degree
Job Zone Comparison	
4 - Job Zone Four: Considerable Preparation Needed	5 - Job Zone Five: Extensive Preparation Needed
A minimum of two to four years of work-related skill, knowledge, or experience is needed for these occupations. For example, an accountant must complete four years of college and work for several years in accounting to be considered qualified.	Extensive skill, knowledge, and experience are needed for these occupations. Many require more than five years of experience. For example, surgeons must complete four years of college and an additional five to seven years of specialized medical training to be able to do their job.
Most of these occupations require a four - year bachelor's degree, but some do not.	A bachelor's degree is the minimum formal education required for these occupations. However, many also require graduate school. For example, they may require a master's degree, and some require a Ph.D., M.D., or J.D. (law degree).
Employees in these occupations usually need several years of work-related experience, on-the-job training, and/or vocational training.	Employees may need some on-the-job training, but most of these occupations assume that the person will already have the required skills, knowledge, work-related experience, and/or training.

Tasks

Computer Programmers

Core Tasks

Generalized Work Activities:

- Interacting With Computers - Using computers and computer systems (including hardware and software) to program, write software, set up functions, enter data, or process information.
- Organizing, Planning, and Prioritizing Work - Developing specific goals and plans to prioritize, organize, and accomplish your work.
- Making Decisions and Solving Problems - Analyzing information and evaluating results to choose the best solution and solve problems.
- Getting Information - Observing, receiving, and otherwise obtaining information from all relevant sources.
- Updating and Using Relevant Knowledge - Keeping up-to-date technically and applying new knowledge to your job.

Specific Tasks

Occupation Specific Tasks:

- Assign, coordinate, and review work and activities of programming personnel.
- Collaborate with computer manufacturers and other users to develop new programming methods.
- Compile and write documentation of program development and subsequent revisions, inserting comments in the coded instructions so others can understand the program.
- Conduct trial runs of programs and software applications to be sure they will produce the desired information and that the instructions are correct.
- Consult with and assist computer operators or system analysts to define and resolve problems in running computer programs.
- Consult with managerial, engineering, and technical personnel to clarify program intent, identify problems, and suggest changes.
- Correct errors by making appropriate changes and rechecking the program to ensure that the desired results are produced.
- Investigate whether networks, workstations, the central processing unit of the system, or peripheral equipment are responding to a program's instructions.
- Perform or direct revision, repair, or expansion of existing programs to increase operating efficiency or adapt to new requirements.
- Perform systems analysis and

Computer Science Teachers, Postsecondary

Core Tasks

Generalized Work Activities:

- Interacting With Computers - Using computers and computer systems (including hardware and software) to program, write software, set up functions, enter data, or process information.
- Training and Teaching Others - Identifying the educational needs of others, developing formal educational or training programs or classes, and teaching or instructing others.
- Updating and Using Relevant Knowledge - Keeping up-to-date technically and applying new knowledge to your job.
- Getting Information - Observing, receiving, and otherwise obtaining information from all relevant sources.
- Thinking Creatively - Developing, designing, or creating new applications, ideas, relationships, systems, or products, including artistic contributions.

Specific Tasks

Occupation Specific Tasks:

- Act as advisers to student organizations.
- Advise students on academic and vocational curricula, and on career issues.
- Collaborate with colleagues to address teaching and research issues.
- Compile bibliographies of specialized materials for outside reading assignments.
- Compile, administer, and grade examinations, or assign this work to others.
- Conduct research in a particular field of knowledge, and publish findings in professional journals, books, and/or electronic media.
- Direct research of other teachers or of graduate students working for advanced academic degrees.
- Evaluate and grade students' class work, laboratory work, assignments, and papers.
- Initiate, facilitate, and moderate classroom discussions.
- Keep abreast of developments in their field by reading current literature, talking with colleagues, and participating in professional conferences.
- Maintain regularly scheduled office hours in order to advise and assist students.
- Maintain student attendance records, grades, and other required records.
- Participate in campus and community events.
- Participate in student recruitment,

programming tasks to maintain and control the use of computer systems software as a systems programmer.

- Prepare detailed workflow charts and diagrams that describe input, output, and logical operation, and convert them into a series of instructions coded in a computer language.
- Train subordinates in programming and program coding.
- Write or contribute to instructions or manuals to guide end users.
- Write, analyze, review, and rewrite programs, using workflow chart and diagram, and applying knowledge of computer capabilities, subject matter, and symbolic logic.
- Write, update, and maintain computer programs or software packages to handle specific jobs such as tracking inventory, storing or retrieving data, or controlling other equipment.

Detailed Tasks

Detailed Work Activities:

- adjust computer operation system
- analyze workflow
- assist co-workers with software problems
- communicate technical information
- configure computers in industrial or manufacturing setting
- consult with customers concerning needs
- consult with managerial or supervisory personnel
- design computer hardware or software interface
- design computer programs or programming tools
- develop computer performance standards
- develop mathematical or computer languages
- develop or maintain databases
- develop records management system
- develop tables depicting data
- direct and coordinate activities of workers or staff
- distinguish details in graphic arts material
- encode equations for processing
- evaluate computer system user requests or requirements
- follow data security procedures
- follow data storage procedures
- identify color or balance
- implement computer system changes
- install computer programs
- maintain client-server database
- maintain or repair computers or related equipment

registration, and placement activities.

- Perform administrative duties such as serving as department head.
- Plan, evaluate, and revise curricula, course content, and course materials and methods of instruction.
- Prepare and deliver lectures to undergraduate and/or graduate students on topics such as programming, data structures, and software design.
- Prepare course materials such as syllabi, homework assignments, and handouts.
- Provide professional consulting services to government and/or industry.
- Select and obtain materials and supplies such as textbooks and laboratory equipment.
- Serve on academic or administrative committees that deal with institutional policies, departmental matters, and academic issues.
- Supervise students' laboratory work.
- Supervise undergraduate and/or graduate teaching, internship, and research work.
- Write grant proposals to procure external research funding.

Detailed Tasks

Detailed Work Activities:

- advise governmental or industrial personnel
- advise students
- collect academic research data
- compile bibliographies of specialized materials
- conduct research on work-related topics
- convert information into instructional program
- design classroom presentations
- develop course or training objectives
- develop instructional materials
- direct and coordinate scientific research or investigative studies
- encourage group participation
- evaluate student performance
- explain complex mathematical information
- follow data security procedures
- follow data storage procedures
- maintain educational records, reports, or files
- make education presentations
- organize educational material or ideas
- prepare educational reports
- program mainframe computer
- record student progress
- resolve symbolic formulations in data processing applications

- monitor computer operation
- prepare instruction manuals
- prepare technical reports or related documentation
- prepare workflow chart
- program computers for electronic engineering applications
- program computers for management analysis applications
- program computers for medical applications
- program computers for social science applications
- program computers using existing software
- program mainframe computer
- provide customer service
- provide technical computer training
- provide technical support to computer users
- recommend software or hardware purchases
- resolve computer program operational problems
- resolve symbolic formulations in data processing applications
- revise or correct errors in computer programs, software, or systems
- supervise programming personnel
- test computer programs or systems
- test data communications hardware or software
- use computer application flow charts
- use computer graphics design software
- use computer programming language
- use computers to enter, access or retrieve data
- use creativity in graphics
- use differential equations in computer programming
- use geographical information system (GIS) software
- use graphic arts techniques
- use interpersonal communication techniques
- use knowledge of mainframe computers
- use object-oriented computer programming techniques
- use project management techniques
- use relational database software
- use spreadsheet software
- use structural analysis techniques to analyze computer systems
- use word processing or desktop publishing software
- write computer software, programs, or code

- teach college level courses
- understand technical operating, service or repair manuals
- use computer application flow charts
- use computer networking technology
- use computer programming language
- use computers to enter, access or retrieve educational data
- use differential equations in computer programming
- use geographical information system (GIS) software
- use knowledge of mainframe computers
- use mathematical or statistical methods to identify or analyze problems
- use object-oriented computer programming techniques
- use oral or written communication techniques
- use public speaking techniques
- use relational database software
- use structural analysis techniques to analyze computer systems
- use teaching techniques
- write research or project grant proposals
- write scholarly or technical research papers

Technology - Examples

- write documentation for computer programming

Technology - Examples
Analytical or scientific software
• SAS software
• Simulation program with integrated circuit emphasis SPICE
Application server software
• Application server software
• IBM WebSphere
Charting software
• Microsoft Office Visio
Compiler and decompiler software
• Code generator software
• Command interpreters
• Compilers
• Decompilers
• Incremental compiler software
• Inline code expander software
• Interpreter software
• Just-in-time compiler
• Mixed code generator
• One pass compiler software
• Partial class generator software
• Retargetable compiler
• Stage compiler
• Threaded code compiler
• Xerces2 Java Parser
Configuration management software
• IBM Rational ClearCase
• Revision control software
Content workflow software
• Workflow software
Data base management system software
• CAST SQL Builder
• Computer Associates integrated data management system CA-IDMS

- Data definition language DDL
- Data manipulation language DML
- dBase Plus
- IBM DB2
- Microsoft Access
- Microsoft SQL Server
- mSQL software
- MySQL software
- Oracle procedural language/structured query language PL/SQL
- Pick software
- Relational database management software
- Sybase SQL Server

Data base reporting software

- ReCrystallize Crystal Reports

Data base user interface and query software

- Structured query language SQL

Development environment software

- A programming language APL
- Activity based costing ABC
- Ada
- Adobe Systems Adobe PostScript
- Algorithmic language ALGOL
- American National Standards Institute ANSI C
- Assembler
- AWK
- B
- Basic combined programming language BCPL
- Beginner's all-purpose symbolic instruction code BASIC
- Borland Delphi software
- C
- Class oriented ring associated language CORAL
- Clipper

- CLU
- Code munger software
- Combined programming language CPL
- Common business oriented language COBOL
- Eclipse software
- Extensible markup language XML
- Extensible stylesheet language XSL
- Flow-Matic
- Formula translation/translator FORTRAN
- FORTH
- Haskell
- Icon
- Interface definition language IDL
- J
- Kernel
- List processing language LISP
- Logo
- Microsoft .NET Framework
- Microsoft Extensible Application Markup Language (XAML)
- Microsoft Visual Basic
- Microsoft Visual Basic Scripting Edition VBScript
- Microsoft Visual Studio
- ML
- MUMPS M
- Parlog
- Pascal
- Programming language one PL/I
- Prolog
- Restructured extended executor REXX
- Ruby
- Scheme
- Source code migration software

- String oriented symbolic language SNOBOL
- Symantec Visual Caf
- Tier generator software
- Web service definition language WDSL

Document management software

- Virage VS Archive

Enterprise resource planning ERP software

- Advanced business application programming ABAP

Graphical user interface development software

- Basis BBx VisualPRO/5
- Graphical user interface GUI development software

Object or component oriented development software

- BETA
- C++
- Categorical abstract machine language CAML
- Common extended self-containing prolog CESP
- DRAGOON software
- E++
- Eiffel
- Emerald
- Extended self-containing Prolog ESP
- Greatis Object Inspector
- Lisp object-oriented programming system LOOPS
- Microsoft Visual Basic.NET
- Microsoft Visual C# .NET
- Modula
- Oberon
- Objective-C
- Oblog
- Polka
- PowerSoft PowerBuilder
- Practical extraction and reporting language Perl

- Python
- Sather
- Self
- Simulation language SIMULA
- Smalltalk
- Sun Microsystems Java

Object oriented data base management software

- Microsoft Visual FoxPro

Operating system software

- Bourne Shell
- Job control language JCL

Program testing software

- Debugging software
- Low-level debugger software
- Source code editor software
- Symbolic debugger software

Project management software

- Microsoft Project

Requirements analysis and system architecture software

- Unified modeling language UML

Spreadsheet software

- Microsoft Excel

Transaction server software

- Customer information control system CICS software

Web platform development software

- Adobe Systems Adobe Cold Fusion
- Adobe Systems Adobe Flex
- Apache Struts
- Asynchronous JavaScript and XML AJAX
- Cascading Style Sheets CSS
- Hypertext markup language HTML
- JavaScript
- Microsoft Active Server Pages ASP
- Microsoft ASP.NET

- Microsoft Silverlight
- Microsoft Visual C#
- PHP: Hypertext Preprocessor
- Ruby on Rails
- Sun Microsystems Java server pages JSP

Word processing software

- Microsoft Word

Tools - Examples

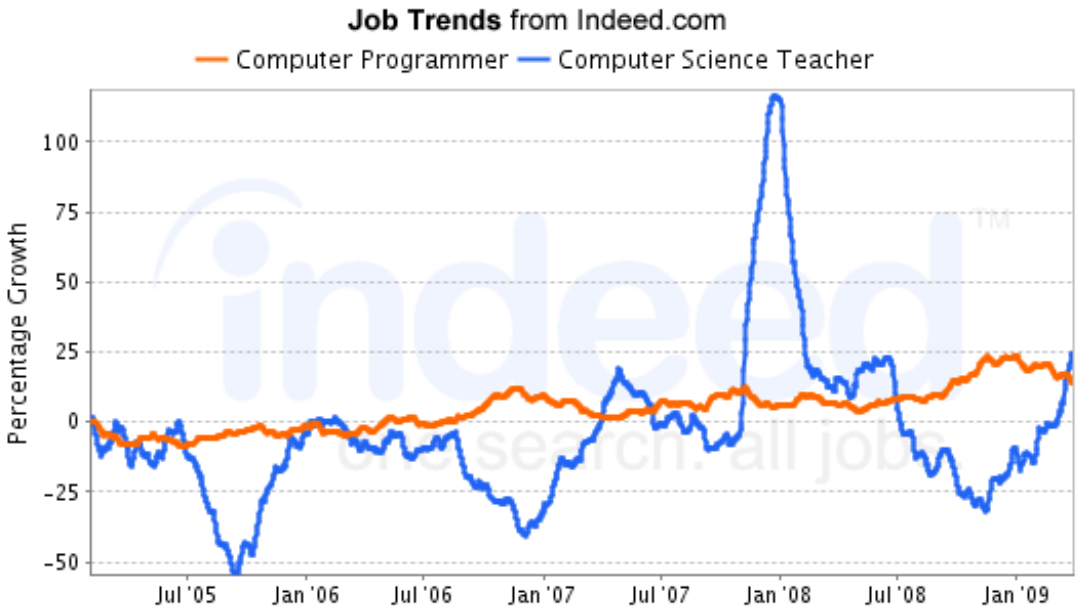
- Computer servers
- Desktop computers
- Mainframe computers
- Serial port cards

Labor Market Comparison

Description	Computer Programmers	Computer Science Teachers, Postsecondary	Difference
Median Wage	$ 58,240	$ 52,380	$(5,860)
10th Percentile Wage	$ 39,650	$ 31,510	$(8,140)
25th Percentile Wage	N/A	N/A	N/A
75th Percentile Wage	$ 77,420	$ 78,390	$ 970
90th Percentile Wage	$ 95,710	$ 95,930	$ 220
Mean Wage	$ 62,540	$ 61,250	$(1,290)
Total Employment - 2007	720	120	-600
Employment Base - 2006	761	113	-648
Projected Employment - 2016	670	129	-541
Projected Job Growth - 2006-2016	-11.9 %	14.2 %	26.1 %
Projected Annual Openings - 2006-2016	16	4	-12

National Job Posting Trends

Trend for Computer Programmers	Trend for Computer Science Teachers, Postsecondary



Data from Indeed

Recommended Programs

No program data for the occupation.

Maine Statewide Promotion Opportunities for Computer Programmers

O*NET Code	Title	Grand TORQ	Job Zone	Employment	Median Wage	Difference	Growth	Annual Job Openings
15-1021.00	Computer Programmers	100	4	720	$58,240.00	$0.00	-12%	16
15-1031.00	Computer Software Engineers, Applications	89	4	1,060	$63,750.00	$5,510.00	30%	47
15-1032.00	Computer Software Engineers, Systems Software	88	4	290	$73,410.00	$15,170.00	11%	8
15-1051.00	Computer Systems Analysts	86	4	1,650	$69,340.00	$11,100.00	20%	78
15-1061.00	Database Administrators	83	4	300	$60,260.00	$2,020.00	20%	11
15-1081.00	Network Systems and Data Communications Analysts	79	3	610	$59,790.00	$1,550.00	47%	54
15-2031.00	Operations Research Analysts	78	5	180	$64,140.00	$5,900.00	12%	6
11-3021.00	Computer and Information Systems Managers	78	5	870	$83,130.00	$24,890.00	8%	21

17-2071.00	Electrical Engineers	77	4	260	$73,050.00	$14,810.00	-10%	6
13-2051.00	Financial Analysts	76	4	210	$71,380.00	$13,140.00	10%	4
17-2072.00	Electronics Engineers, Except Computer	76	4	210	$76,420.00	$18,180.00	-26%	4
13-2052.00	Personal Financial Advisors	74	3	360	$94,100.00	$35,860.00	10%	13
19-1041.00	Epidemiologists	73	5	20	$58,250.00	$10.00	20%	1
17-2112.00	Industrial Engineers	73	4	580	$68,350.00	$10,110.00	11%	22
25-1054.00	Physics Teachers, Postsecondary	72	5	50	$68,770.00	$10,530.00	10%	2

Top Industries for Computer Science Teachers, Postsecondary

Industry	NAICS	% in Industry	Employment	Projected Employment	% Change

Top Industries for Computer Programmers

Industry	NAICS	% in Industry	Employment	Projected Employment	% Change
Computer systems design and related services	541500	30.52%	132,767	143,405	8.01%
Software publishers	511200	4.26%	18,545	19,103	3.01%
Management of companies and enterprises	551100	3.78%	16,457	15,177	-7.78%
Colleges, universities, and professional schools, public and private	611300	3.67%	15,950	14,275	-10.50%
Employment services	561300	2.94%	12,805	12,965	1.25%
Professional and commercial equipment and supplies merchant wholesalers	423400	2.83%	12,306	11,476	-6.75%
Self-employed workers, primary job	000601	2.61%	11,368	9,689	-14.77%
Data processing, hosting, and related services	518200	2.38%	10,362	11,206	8.15%
State government, excluding education and hospitals	929200	2.14%	9,330	7,325	-21.50%
Management, scientific, and technical consulting services	541600	1.92%	8,356	11,933	42.82%
Federal government, excluding postal service	919999	1.89%	8,206	6,206	-24.37%
Local government, excluding education and hospitals	939300	1.65%	7,193	6,464	-10.13%
Direct insurance (except life, health, and medical) carriers	524120	1.41%	6,151	5,143	-16.38%
Depository credit intermediation	522100	1.31%	5,698	4,648	-18.44%
Self-employed workers, secondary job	000602	1.31%	5,682	4,525	-20.36%